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ABSTRACT

An MHD stand-alone high efficiency power generation method comprises following three steps; a thermo-chemical coal gasification step in which waste heat of exhaust gas from an MHD generator 1b of an MHD power generation apparatus 1 is converted into chemical energy of coal syngas by a coal gasification process in the furnace 2; a pre-heating step in which the waste heat of the exhaust gas through the coal gasification furnace 2 is recovered as a sensible heat of a coal syngas and hydrogen mixture by heat exchange in the pre-heater 3; and an iodine – sulfur reaction step in which the waste heat of the exhaust gas through the fuel pre-heater is converted into hydrogen energy by splitting water in the IS system 4. By means of the said three steps, the high temperature waste heat from the MHD generator 1b is regenerated as the sensible heat of the fuel mixture and the fuel chemical energy. The method further comprises a step in which the regenerated energy is re-circulated to a combustor 1a of the MHD power generation apparatus 1, and the fuel consisting of the syngas produced in the gasification furnace and the hydrogen produced in the iodine – sulfur unit is combusted with pure oxygen. As a result, a high efficiency power generation system with no carbon dioxide emission capability can be designed by using an MHD stand-alone unit, and using coal resource as the primary fuel.